

**REMARKS**

Upon entry of the instant amendment, claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 will be canceled without prejudice or disclaimer of the subject matter recited therein, and claims 30-60 will be added, whereby claims 30-60 will be pending. Claims 30, 44 and 55 are independent claims.

Applicants respectfully submit that the newly-submitted claims are supported in Applicants originally filed disclosure. For example, the Examiner's attention is directed to page 2 of Applicants' specification, beginning in the first paragraph, and page 7, beginning in the fourth paragraph, wherein it is disclosed that the present invention is directed to the use of an enzyme for the manufacture of an agent for treatment and/or prophylaxis of a bacterial infection. Moreover, it is disclosed that an advantage of using a diet containing xylanase or a cellulase for rearing animals is that the amount of antimicrobial drugs which have previously been routinely incorporated in the diet can be reduced, or in some cases omitted entirely. This advantage associated with Applicants' invention will be further discussed below in response to the rejections based upon prior art. Accordingly, the amendment to the claims and the corresponding amendment to the specification does not constitute new matter, and entry is appropriate.

Moreover, the specification has been amended to include headers.

Reconsideration and withdrawal of the rejections of record are respectfully requested.

**Discussion Of April 17, 2003 Interview**

Applicants express appreciation for the courtesies extended by the Examiner during an April 17, 2003 interview at the Patent and Trademark Office with Arnold Turk on behalf of the Applicants. During the interview, Applicants' specification was thoroughly discussed, especially the disclosed advantages associated with Applicants' invention in the treatment of bacterial infections in the absence of antimicrobial drugs or in the presence of reduced amounts of antimicrobial drugs. Articles were shown to the Examiner to demonstrate the use of antimicrobial drugs in chickens to treat infections, and to demonstrate the desirability of reducing/eliminating the use of antimicrobial drugs in the diet of chickens. Moreover, articles were shown to the Examiner that demonstrate the advantages of Applicants' invention.

Still further, claim language was discussed with the Examiner which was submitted to be even more clearly directed to Applicants' advantageous process which includes feeding chickens a diet which reduces or eliminates antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, which diet does not include antimicrobial drugs or includes antimicrobial drugs in reduced amounts. It was pointed out antimicrobial drugs are ordinarily included in the diet of chickens to treat infections, and that one having ordinary skill in the art prior to Applicants' invention would not have been motivated to eliminate or reduce antimicrobial drugs in the treatment of infections in chickens. Accordingly, it was argued that Applicants' invention is not inherently practiced in the prior art, and there is no motivation in the prior art to arrive at Applicants' invention.

The Examiner pointed to disclosures in certain of the documents pertaining to the heat stability of certain xylanases and the prevention of infection in feed during its production. It was pointed out that this pertains to the production of the feed, and in no way teaches or suggests that xylanases can be used in the manner recited in Applicants' claims to treat infections in chickens.

It was further pointed out that Applicants' invention can be used in a diet to inhibit the formation of infections in chickens, e.g., the treatment will at least reduce the formation of infections. Moreover, Applicants' invention can be used in a diet to treat chickens that have infections.

The Examiner indicated that claims including language as discussed during the interview would not be entered after final rejection. Therefore, it was indicated that Applicants would consider the filing of a Request for Continued Examination to present the amendment and arguments.

The arguments and articles presented to the Examiner during the interview, and the claims as discussed with the Examiner are included in the amendment and arguments presented herein.

#### **Request For Confirmation of Receipt Of Certified Copy**

Applicants note that a certified copy of GB 9715214.4 was filed by Certificate of Mailing on December 28, 2000. **The Examiner is therefore respectfully requested to acknowledge the claim of priority under 35 U.S.C. 119 as well as receipt of the certified copy.**

**Submission Of Supplemental Information Disclosure Statement**

Applicants are submitting on even date herewith a Supplemental Information Disclosure Statement. The Examiner is respectfully requested to consider this disclosure statement, and to confirm such consideration by initialing the Form PTO-1449 submitted therewith, and forwarding a copy of the initialed form with the next communication from the Patent and Trademark Office.

**Response To Rejection Under 35 U.S.C. 112, First Paragraph**

Claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 are rejected under 35 U.S.C. 112, first paragraph, as not being enabled by the specification. This rejection asserts that Applicants have not shown in the specification that the method in fact does “prevent” bacterial infections in chickens. The rejection asserts that without such evidence from the specification or other evidence on the record there is no substantial showing that bacterial infections will be prevented in chickens.

In response, Applicants respectfully submit that the Examples in Applicants’ originally filed application, and the articles submitted herewith establish that Applicants’ invention is enabled for the treatment and/or prophylaxis of infections in chickens. Thus, Applicants’ invention can be used in a diet to inhibit the formation of infections in chickens, e.g., the treatment will at least reduce the formation of infections. Moreover, Applicants’ invention can be used in a diet to treat chickens that are infected. Thus, Applicants’ claims are directed to methods that can, for example, prevent the formation of infection in a chicken when included in a

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diet fed to chickens, and can be fed to chickens that are already infected to therapeutically treat the infection. Thus, Applicants' invention involves the treatment and/or prophylaxis of bacterial infections, and is therapeutic and preventive.

Applicants therefore respectfully submit that Applicants' claims are enabled, whereby this ground of rejection should be withdrawn.

### **Response To Rejections Based Upon Prior Art**

Applicants note that the following rejections are set forth in the Final Office Action:

Claims 1, 3, 6-8, 13, 15, 17, 21 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 2,287,867 (hereinafter "GB '867").

Claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Bedford et al., U.S. Patent No. 5,612,055 (hereinafter "Bedford '055").

Claims 1, 3, 6-8, 13, 15 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Clarkson et al., U.S. Patent No. 5,902,581 (hereinafter "Clarkson").

Claims 1, 3, 6-8, 13, 15, 17 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Hansen et al., U.S. Patent No. 5,817,500 (hereinafter "Hansen").

Claims 21-26 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Borriss et al., U.S. Patent No. 5,470,725 (hereinafter "Borriss").

Claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Bedford et al., U.S. Patent No. 5,624,678 (hereinafter "Bedford '678").

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Claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB '867 in view of Bedford '055 or Bedford '678.

Claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clarkson in view of Bedford '055 or Bedford '678.

Claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hansen in view of GB '867.

Claims 1, 3, 6-8, 13, 15, 17, 18, 21-26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borriss in view of Bedford '055 or Bedford '678.

In view of the multiplicity of rejections and the similarity of the issues presented therein, and in an attempt to advance prosecution, Applicants are responding to the rejections by submitting a description of their invention and providing a discussion of the advantages associated with their invention. Following such description and discussion, Applicants will provide a review of the prior art, and will point out the differences between their disclosed and claimed invention and the prior art of record. From this, it will be seen that Applicants' disclosed and claimed invention is not taught nor suggested by the prior art of record.

As disclosed in Applicants' originally filed specification (which claims priority of GB 9715214.4, filed July 18, 1997, and was filed as PCT/EP98/04440, on July 16, 1998), such as at page 7, beginning in the fourth paragraph, the advantage of using a diet containing xylanase or a cellulase for rearing animals is that the amount of antimicrobial drugs which have previously been routinely incorporated in the diet can be reduced, or in some cases omitted entirely. This enables considerable economic savings to be achieved in view of the relative expense of

antibiotics. Moreover, in some countries where such drugs are banned, it represents a totally new approach to the control of bacteria diseases.

Moreover, as disclosed beginning in the next paragraph of Applicants' specification, when omitting antibiotics from an animal's diet there are several potential further benefits. For example, it has previously been necessary to withdraw antibiotics from the animal's diet for a certain time prior to slaughter. This ensures that the meat is relatively free from such drugs and thus fit for human consumption. In contrast, according to the present invention, if antibiotics are entirely omitted from an animal's diet, then the animal can be slaughtered at any age rather than after a certain withdrawal period. This affords the farmer improved flexibility and removes the risk of animals becoming infected shortly prior to slaughter.

Still further, as disclosed in Applicants' specification, there are economic advantages, such as the meat being marketed as being free of antibiotics. Moreover, even if the inclusion of the enzyme only enables the level of inclusion of antibiotics to be reduced, then the overall cost of controlling bacterial infection will be reduced. Synergy or potentiation of the antibiotic with the enzyme may extend the useful life of the antibiotic, such as due may be due to a build up of resistance due to excessive use of the antibiotic.

As disclosed on page 2 of Applicants' specification, the paragraph beginning at the middle of the page, current methods of control of bacterial infections include the application of antibiotics, feed sterilization and careful and controlled handling and cooking of the carcass after slaughter. The application of antibiotics has proved unpopular with consumer groups wishing to reduce the quantity of potentially harmful chemicals in food. The use of antibiotics also has the

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problem that antibiotic-resistant strains of bacteria can be created, making such infections more difficult to treat in the future. The prophylactic use of antibiotics in animal feeds has thus been regulated in some countries effectively reducing the available methods of control.

Applicants' method has the advantage of reducing or eliminating antimicrobial drugs in the treating or preventing of a bacterial infection in chickens. For example, as recited in Applicants' independent claim 30, Applicants' invention provides a method for reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, the method comprising feeding the chickens a diet which diet is effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, the diet including xylanase with the xylanase being present in an amount effective for treatment and/or prophylaxis of the bacterial infection in the absence of an antimicrobial drug or in the presence of an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the xylanase, and the diet not containing an antimicrobial drug or containing an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the xylanase.



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Applicants' method provides for the beneficial reduction or elimination of antimicrobial drugs in the treatment and/or prophylaxis of bacterial infections in chickens. This enables the economic advantage of reduced use or the elimination of antibiotics in the treatment of chickens. Coupled with this economic advantage is the scientific advantage of reducing the change of creating antibiotic-resistant strains of bacteria. Moreover, the withdrawal period from antibiotics prior to slaughter of the animals can be eliminated. Such elimination of the withdrawal period prior to slaughter is not taught or suggested in the prior art.

During the above-noted interview, Applicants showed the Examiner a number of articles demonstrating the use of antibiotics in the poultry industry, the desire to cut back on such antibiotic use, and the ability of Applicants' invention to achieve the long felt need to reduce or eliminate antibiotics in the poultry industry. Thus, the Examiner is invited to review these documents, which are being submitted on even date herewith in a Supplemental Information Disclosure Statement, to see the state of the art and the beneficial advantages of Applicants' invention.

In particular, attention is directed to the following articles pertaining to the use of antibiotics in animal feeds:

Burrous, "Poultry Industry Quietly Cuts Back On Antibiotic Use - Major Change In Policy" appearing in The New York Times, Sunday, February 10, 2002,

Schuff, "Reports Show Prevalence of Bacteria Contamination", Journal of Feedstuffs, Vol. 74, No. 51, December 16, 2002, pages 1 and 22.

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Fenster, "Feed Additives: A Global Market Study", Animal Pharm Reports, pages 1-3 and 75-79, January 30, 2001.

Moreover, attention is directed to the following articles, including articles by the inventors of the present application, which relate the use of antibiotics in poultry feeds, the decision of the European Union to eliminate certain antibiotics in animal feeds, and the above-noted advantages of Applicants' invention.

Bedford, "Removal of Antibiotic Growth Promoters From Poultry Diets: Implications and Strategies To Minimise Subsequent Problems", World's Poultry Science Journal, Vol. 56, December 2000, pages 347-365.

Apajalahti et al., "Improve Bird Performance By Feeding Its Microflora", World Poultry, Elsevier Volume 15, No. 2, 1999, total of 3 pages.

Jones, "Why Chunky Chickens Are Better For Your Health", New Scientist, March 24, 2001, total of 1 page.

Bedford, "Enzymes, Antibiotics And The Intestinal Microflora", Feed Mix, Vol. 9, No. 2, 2001, pages 32-34.

Fernandez et al., "Diet Influences The Colonisation Of *Campylobacter jejuni* And Distribution Of Mucin Carbohydrates In The Chick Intestinal Tract", Cell. Mol. Life Sci., 57 (2000) 1793-1801.

Tucker et al., "Feed Enzymes And Betain In Antibiotic Free Poultry Diets", AFMA Matrix, AFMA, PO Box 4473, Rivonia 2128, South Africa, March 2000, Vol. 9, No. 1, total of 3 pages.

Danisco Press Release, "Food Poisoning Bacteria *Campylobacter* and *Salmonella* Reduced In Broilers Fed Diets Supplemented With Enzyme", August 2, 2002, total of 2 pages.

Applicants respectfully submit that the prior art of record does not teach or suggest Applicants' invention which, as recited in independent claim 30, provides a method for reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, the method comprising feeding the chickens a diet which diet is effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, the diet including xylanase with the xylanase being present in an amount effective for treatment and/or prophylaxis of the bacterial infection in the absence of an antimicrobial drug or in the presence of an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the xylanase, and the diet not containing an antimicrobial drug or containing an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the xylanase.

Moreover, the prior art of record does not teach or suggest, as recited in Applicants' independent claim 44, a method for reducing or eliminating antimicrobial drugs in the treatment

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and/or prophylaxis of a bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, the method comprising feeding the chickens a diet comprising a feed including a cellulase and at least about 25% by weight of a cereal selected from the group consisting of wheat, maize, rye, barley, oats, triticale, rice, sorghum and mixtures thereof, the diet being effective for treatment and/or prophylaxis of bacterial infection in the chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, and the cellulase being present in an amount effective for treatment and/or prophylaxis of the bacterial infection in the absence of an antimicrobial drug or in the presence of an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the cellulase, and the diet not containing an antimicrobial drug or containing an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the cellulase.

Still further, the prior art of record does not teach or suggest, as recited in Applicants' independent claim 55, a method for reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of a bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, the method comprising feeding the chickens a diet comprising a feed including a  $\beta$ -glucanase and at

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least about 25% by weight of wheat, the diet being effective for treatment and/or prophylaxis of bacterial infection in the chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof, and the  $\beta$ -glucanase being present in an amount effective for treatment and/or prophylaxis of the bacterial infection in the absence of an antimicrobial drug or in the presence of an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the  $\beta$ -glucanase, and the diet not containing an antimicrobial drug or containing an antimicrobial drug at a concentration that is not effective for treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence of the  $\beta$ -glucanase.

Still further, the prior art of record does not teach or suggest the subject matter of Applicants' dependent claims. For example, the prior art of record does not teach or suggest the diet being fed to chickens without a withdrawal period prior to slaughtering of the chickens.

#### GB '867

In contrast to Applicants' invention, GB '867 discloses the use of a xylanase for assisting livestock to digest protein and/or amino acids present in a feed. GB '287 discloses that such a use increases the protein and amino acid digestibility of the livestock's diet. Moreover, it is disclosed that such a use enables the actual protein content of feed to be reduced by including

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lower levels of relatively costly protein supplements, such as fishmeal and meatmeal. Still further, it is disclosed that the use enables the content of energy supplements present in the feed to be reduced from the amounts conventionally used without reducing the feed's nutritional value.

GB '867 is silent with respect to treating bacterial infections in chickens. In this regard, as noted in Applicants' originally filed specification and as supported by the above-noted articles, antibiotics are utilized in the diets of chickens to treat bacterial infections caused by bacteria. There has been a long felt need to reduce or eliminate antibiotics from the diets of chickens when treating bacterial infections; however, until Applicants' invention, the art has not been able to treat bacterial infections in chickens without using doses of antibiotics at a concentration that are effective for treatment and/or prophylaxis of bacterial infection. Applicants respectfully submit that, at the time of Applicants' invention, conventional diets for chickens included therein therapeutic doses of antibiotics for treating bacterial infections in chickens. Applicants' invention of reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof was not practiced either expressly or inherently in the prior art, because the prior art does not teach or suggest that the antimicrobial drugs that are used in the diet could be reduced or eliminated when treating bacterial infections in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof.

Applicants' invention treats the bacterial infection using a diet, and includes ingredients as recited in Applicants' claims while utilizing reduced amounts of antibiotics or the absence of antibiotics. In other words, to treat bacterial infections utilizing the feed of GB '867, one having ordinary skill in the art would incorporate therapeutic doses of antibiotics in the feed of GB '867 because of the lack of any knowledge that xylanase, cellulase, or  $\beta$ -glucanase has antimicrobial activity.

Accordingly, GB '867 does not teach or suggest Applicants' disclosed and claimed invention.

#### **Bedford '055**

Similarly, Bedford '055 is directed to an enzyme feed additive comprising (i) a xylanase; (ii) a protease; and optionally (iii) a  $\beta$ -glucanase wherein the ratio of the units of xylanase activity per g of the feed additive to the units of  $\beta$ -glucanase activity per g of the feed additive is 1:0-0.25. Bedford '055 discloses that it has been found that the inclusion of the disclosed enzyme feed additive in the diet of an animal enables the animal to digest the diet more efficiently. Thus, it is disclosed that the addition of the additive to a feed increases the proportion of feed protein and energy which the animal can derive from the feed, and that this in turn improves the FCR of the feed making it more economical in use. Bedford '055 does disclose in Example 3 that a starter feed was used for days 0-7 that did not include antibiotics, anticoccidial or any enzyme. However, Bedford '055 does not teach nor suggest Applicants' invention of reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of

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bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof. Applicants' invention treats the bacterial infection using a diet, and includes ingredients as recited in Applicants' claims while utilizing reduced amounts of antibiotics or the absence of antibiotics. In other words, to treat bacterial infections utilizing the feed of Bedford '055, one having ordinary skill in the art would incorporate therapeutic doses of antibiotics in the feed of Bedford '055 because of the lack of any knowledge that xylanase, cellulase, or  $\beta$ -glucanase has antimicrobial activity.

Accordingly, Bedford '055 does not teach or suggest Applicants' disclosed and claimed invention.

### **Clarkson**

Clarkson discloses beginning at column 2, line 30 that there is now a substantial body of evidence showing that incorporating certain (supplementary) enzymes in cereal-based animal feeds can be advantageous in reducing the viscosity of material present in the animal's gut. It is disclosed that this reduction can be achieved by enzymes such as xylanases which hydrolyse soluble xylans thereby reducing digesta viscosity which is an important constraint on the process of digestion.

Clarkson further discloses that the use of enzyme supplements, such as xylanase, in animal feed is complicated by the processing requirements for grain supplements. It is disclosed that often, such enzyme supplements are obtained by impregnating the enzyme onto a



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physiologically acceptable carrier, such as a cereal, and the impregnated carrier is mixed with the other components of the feed and then pressed into cubes or pellets for feeding directly to animals. It is disclosed that the processes which have been developed make use of relatively high temperatures to improve the efficiency of the manufacturing process and to produce feeds which are free from harmful bacteria, particularly *Salmonella*. It is also disclosed that the use of high temperatures improves the quality and durability of the resulting cubes and pellets, increases the range of ingredients which can be efficiently handled and also increases the level of liquid ingredients, such as fat and molasses, which can be incorporated into the feed.

It is further disclosed that unfortunately the high temperature and high pressure processing conditions characteristic of expander and pelleting technology, particularly when applied in the moist conditions normally encountered during pelleting, are potentially destructive to certain feed components, such as any enzymes, including xylanases, which are present. Thus, it is disclosed that the prior art enzymes have generally had the problem that they are not sufficiently stable under the processing conditions of commercial pelleting operations to allow economical use of such pelleting techniques, and Clarkson is improving upon the xylanase that is being used.

During the above-noted interview, the Examiner pointed to the top of column 3 of Clarkson for the assertion that Clarkson discloses that xylanase is known to have antibiotic activity. However, this disclosure relates to the use of high temperatures in the production of feed to produce feeds that are free from harmful bacteria, such as *Salmonella*. Thus, Clarkson discloses the use of heat to prevent the presence of harmful bacteria in the feed without

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destroying the xylanase. Clarkson does not teach that xylanases have antibiotic activity. At most, Clarkson is trying to preserve the activity of the xylanase such as for increasing body weight gain and Feed Conversion Ratios (FCR) values of chicken feed, and not for its effect of having antimicrobial activity.

Clarkson does not teach nor suggest Applicants' invention of reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof. In contrast, Applicants' invention treats the bacterial infection using a diet, and includes ingredients as recited in Applicants' claims while utilizing reduced amounts of antibiotics or the absence of antibiotics. In other words, to treat bacterial infections utilizing the feed of Clarkson, one having ordinary skill in the art would incorporate therapeutic doses of antibiotics in the feed of Clarkson because of the lack of any knowledge that xylanase, cellulase, or  $\beta$ -glucanase has antimicrobial activity.

Accordingly, Clarkson does not teach or suggest Applicants' disclosed and claimed invention.

## **Hansen**

Hansen is directed to improved feed enhancing enzymes which have excellent thermostability in order that the feed enhancing enzymes can be incorporated into feed under conditions preventing microbial infections in the feed. Hansen does not disclose that his

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thermostable feed enhancing enzymes have any antimicrobial activity when administered in a chicken diet.

Expanding upon the above, Applicants note that Hansen discloses, beginning at column 1 line 64, that:

According to the present invention it has now been found that when compared to conventional feed enhancing enzymes, the xylanase derived from *Thermomyces lanuginosus* is an excellent feed enhancing enzyme which shows significant improvement of the feed utilization when added to animal feed. Moreover, owing to an excellent thermostability, the xylanase preparation derived from *Thermomyces lanuginosus* is particularly well suited for being processed into feed additives at conditions preventing microbial infections, in particular *Salmonella* infection. It has also been found that the xylanase derived from *Thermomyces lanuginosus* exerts a significant reduction of digesta viscosity, which indicates a significant improvement in the chicken feed conversion efficiency.

Following the disclosure of Hansen, one having ordinary skill in the art would understand that the xylanase disclosed by Hansen can be processed into feed at conditions that prevent microbial infections in the feed itself. Hansen does not teach nor suggest Applicants' invention of reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof. Applicants' invention treats the bacterial infection using a diet, and includes ingredients as recited in Applicants' claims while utilizing reduced amounts of antibiotics or the absence of antibiotics. In other words, to treat bacterial infections utilizing the feed of Hansen one having ordinary skill in the art would incorporate therapeutic doses of antibiotics in the feed of Hansen because of the lack of any knowledge that xylanase, cellulase, or  $\beta$ -glucanase has antimicrobial activity.

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— untrue.

Accordingly, Hansen does not teach or suggest Applicants' disclosed and claimed invention.

**Borriss**

Borriss discloses thermostable (1,3-1,4)- $\beta$ -glucanases and their use in food manufacturing and feed manufacturing. For example, at column 3, line 62 et seq., Borriss discloses that the properties of the thermostable (1,3-1,4)- $\beta$ -glucanases of his invention makes it interesting to use the enzyme where it is desirable to obtain (1,3-1,4)- $\beta$ -glucanases activity at high temperature and possibly at low pH, e.g. in the manufacturing of coffee surrogates or feed pellets, especially for use in feeding poultry. Borriss discloses that poultry are not able to degrade  $\beta$ -glucans in the feed and pelleted feed containing high amounts of  $\beta$ -glucans caused reduced feed/weight gain ratios and also digestive disorders. Borriss discloses that it is advantageous to degrade the  $\beta$ -glucans in the feed by adding (1,3-1,4)- $\beta$ -glucanases to the feed. Borriss points out that production of the feed pellets takes place at high temperatures meaning that non-thermostable (1,3-1,4)- $\beta$ -glucanases are rapidly degraded, and that this problem can now be solved by using the thermostable (1,3-1,4)- $\beta$ -glucanase of the invention in the production.

As with Hansen, following the disclosure of Borriss, one having ordinary skill in the art would understand that the (1,3-1,4)- $\beta$ -glucanase disclosed by Borriss can be processed into feed at conditions that prevent microbial infections in the feed itself. Borriss does not teach nor suggest Applicants' invention of reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group

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consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof.

Applicants' invention treats the bacterial infection using a diet, and includes ingredients as recited in Applicants' claims while utilizing reduced amounts of antibiotics or the absence of antibiotics. In other words, to treat bacterial infections utilizing the feed of Borriss one having ordinary skill in the art would incorporate therapeutic doses of antibiotics in the feed of Borriss because of the lack of any knowledge that xylanase, cellulase, or  $\beta$ -glucanase has antimicrobial activity.

Accordingly, Borriss does not teach or suggest Applicants' disclosed and claimed invention.

#### **Bedford '678**

Bedford '678 is directed to a method of use, and a composition, of a carbohydrase and/or a protease for the manufacture of an agent for the treatment and/or prophylaxis of coccidiosis. The agent can be in the form of a cereal-based animal feed. The carbohydrase may be a polysaccharidase such as a xylanase or a cellulase e.g.,  $\beta$ -glucanase. Moreover, the agent may include conventional non-enzymic anticoccidial agents. Thus, Bedford '678 is directed to the treatment of coccidiosis, which is a disease which results from an infection of the digestive tract by parasitic protozoa of the order Coccidia. Bedford '678 is silent with respect to reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof. Bedford '678 does not teach or suggest treatment

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of bacterial infection using a diet, and including ingredients as recited in Applicants' claims while utilizing reduced amounts of antibiotics or the absence of antibiotics. In other words, to treat bacterial infections utilizing the feed of Bedford '678 one having ordinary skill in the art would incorporate therapeutic doses of antibiotics in the feed of Bedford '678 because of the lack of any knowledge that xylanase, cellulase, or  $\beta$ -glucanase has antimicrobial activity.

Accordingly, Bedford, '678 does not teach or suggest Applicants' disclosed and claimed invention.

#### **Response To Combinations Of Documents**

From the above, it is seen that none of the documents utilized in the rejections of record teaches or suggests Applicants' disclosed and claimed invention. Moreover, any combination of these documents would not arrive at Applicants' disclosed and claimed invention. In particular, the rejections include combinations of GB '867 in view of Bedford '055 or Bedford '678; Clarkson in view of Bedford '055 or Bedford '678; Hansen in view of GB '867; and Borriss in view of Bedford '055 or Bedford '678. In these grounds of rejection, it is basically asserted that Applicants' claims do not recite any different steps to the method, and that the method of the instant claims and the method of the references are the same.

In response, Applicants' claimed methods have been clarified to be directed to methods for reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*,

*Campylobacter*, *Clostridium perfringens*, and mixtures thereof in the absence an antimicrobial drug or in the presence of reduced concentrations of an antimicrobial drug.

Applicants note that the Final Office Action contends that when feeding chickens feed which contains xylanase that improves utilization of the feed by the chickens, it would have been obvious to identify chickens that are sick such as having one of the claimed infections since it is routine in raising chickens to identify sick chickens and it would have been obvious to continue feeding the feed to the sick chickens for the same reasons as feeding it to the healthy chickens since the feed makes the chickens grow better and be healthier. Moreover, the rejections assert that chickens that are healthier can resist infection better.

In response, Applicants respectfully submit that these rejections are without appropriate basis, and are especially inapplicable to the presently claimed invention. For example, the present invention is directed to reducing or eliminating antimicrobial drugs in the treatment and/or prophylaxis of bacterial infection in chickens caused by bacteria selected from the group consisting of *Salmonella*, *Campylobacter*, *Clostridium perfringens*, and mixtures thereof. Thus, Applicants' invention treats the bacterial infection using a diet, and includes ingredients as recited in Applicants' claims while utilizing reduced amounts of antibiotics or the absence of antibiotics. In contrast, to treat bacterial infections utilizing any feed and/or combinations of feeds in the prior art of record, one having ordinary skill in the art would incorporate antibiotics at a concentration that is effective for treatment and/or prophylaxis of bacterial infection in the feeds or modified feeds because of the lack of any knowledge that xylanase, cellulase, or  $\beta$ -

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glucanase has antimicrobial activity. Accordingly, there is no teaching or suggestion of practicing Applicants' disclosed and claimed methods in prior art of record.

In view of the above, the rejections of record should be withdrawn.

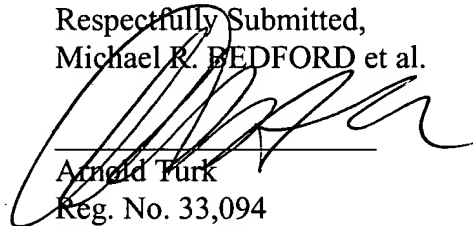
### CONCLUSION

For the reasons advanced above, Applicants respectfully submit that all pending claims patentably define Applicants' invention.

Allowance of the application with an early mailing date of the Notices of Allowance and Allowability is therefore respectfully requested.

Should the Examiner have any further comments or questions, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully Submitted,  
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